

WHAT IS CLAIMED IS:

- 1 1. A communication system for implementing an overall communication policy comprising:
2 a first interface for accepting a first plurality of separate communication links forming
3 a first trunked communication link;
4 a second communication interface for accepting a second plurality of separate
5 communication links forming a second trunked communication link; and
6 a plurality of processors, each coupled to a corresponding different one of the first
7 plurality of separate communication links and coupled to a corresponding different one of
8 the second plurality of communication links, and coupled to one another over a
9 communication channel;
10 wherein each processor in the plurality of processors is configured to implement a
11 separate communication policy for data passing between the first trunked communication
12 link and a corresponding one of the second plurality of communication links such that
13 together the separate communication policies approximate the overall communication
14 policy, and wherein the plurality of processors are further configured to communicate
15 among one another to adjust the separate communication policies to adapt to data flows
16 passing through the processors.
17
18 2. The system of claim 1, wherein adapting to data flows includes a first processor in the
19 plurality of processors borrowing bandwidth from a second processor in the plurality of
20 processors.
21
22 3. The system of claim 1, wherein each processor in the plurality of processors has a copy
23 of each communication policy in the communication system and communicates with the
24 other processors in the plurality of processors to keep state information current for each
25 such copy.
26
27 4. The system of claim 3, wherein the plurality of processors is divided into a plurality of
28 active processors and a plurality of standby processors, such that each processor in the
29 plurality of active processors actively implements a communication policy on data, while
30 a standby processor in the plurality of standby processors monitors the plurality of active

31 processors for a failure on an active processor, and upon detecting the failure the standby
32 processor joins the plurality of active processors, thus implementing the overall
33 communication policy.

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35 5. The system of claim 1, wherein each processor in the plurality of processors mirrors state
36 information for reporting across the communication system.

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38 6. The system of claim 1, wherein each processor in the plurality of processors mirrors state
39 information for management across the communication system.

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41 7. The system of claim 1, wherein the overall communication policy is only implemented
42 for traffic traveling from the first interface to the second communication interface.

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44 8. The system of claim 1, wherein the overall communication policy is implemented for
45 traffic traveling between the first interface and the second communication interface in
46 either direction.

47
48 9. A communication system for implementing a communication policy comprising:

49 a first communication link;

50 a second communication link;

51 a first processor coupled to the first and second communication links, configured to
52 implement the communication policy for data passing between the first communication
53 link and the second communication link; and

54 a second processor coupled to the first and second communication links, the second
55 processor in communication with the first processor to maintain a mirror configuration on
56 the second processor to implement the communication policy in a standby status relative
57 to the first processor;

58 wherein the first processor implements the communication policy until the second
59 processor detects a failure in the first processor, at which time the second processor
60 implements the communication policy.

62 10. The system of claim 9, wherein, in response to the failure in the first processor, the first
63 processor places itself in a standby status relative to the second processor.
64

65 11. A communication system for implementing an overall communication policy comprising:

66 a first communication link;

67 a second communication link;

68 a plurality of processors, each processor in the plurality of processors configured to
69 implement the communication policy for data passing between the first communication
70 link and the second communication link;

71 a first plurality of aggregator/disaggregator network devices arranged between the
72 plurality of processors and the first communication link;

73 a second plurality of aggregator/disaggregator network devices arranged between the
74 plurality of processors and the second communication link;

75 a first mesh, including a plurality of network links such that a link in the plurality of
76 network links exists to join each processor in the plurality of processors to each
77 aggregator/disaggregator in the first plurality of aggregator/disaggregator network
78 devices; and

79 a second mesh, including a plurality of network links such that a link in the plurality
80 of network links exists to join each processor in the plurality of processors to each
81 aggregator/disaggregator in the second plurality of aggregator/disaggregator network
82 devices;

83 wherein each processor in the plurality of processors is configured to implement a
84 separate communication policy for data passing between the first communication link via
85 a first aggregator/disaggregator in the first plurality of aggregator/disaggregator network
86 devices and the second communication link via a corresponding one of the second
87 plurality of aggregator/disaggregator network devices, such that together the separate
88 quality-of-service policies approximate the overall communication policy, and wherein
89 the plurality of processors are further configured to communicate among one another to
90 adjust the separate communication policies to adapt to data flows passing through the
91 processors.
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93 12. The system of claim 11, wherein each processor in the plurality of processors has a copy
94 of each communication policy in the communication system and communicates with the
95 other processors in the plurality of processors to keep state information current for each
96 such copy.

97
98 13. The system of claim 12, wherein the plurality of processors is divided into a plurality of
99 active processors and a plurality of standby processors, such that each processor in the
100 plurality of active processors actively implements a communication policy on data, while
101 a standby processor in the plurality of standby processors monitors the plurality of active
102 processors for a failure on an active processor, and upon detecting the failure the standby
103 processor joins the plurality of active processors, implementing a communication policy
104 on data previously associated with the active processor.

105
106 14. A computer-based method for scheduling network packet traffic for transmission
107 according to a class-based queuing hierarchy, comprising:
108 creating a matrix having a fixed size, one dimension of the matrix representing a
109 plurality of class priorities, another dimension of the matrix representing a plurality of
110 levels corresponding to levels of the hierarchy, and cells in the matrix including
111 collections of references to nodes in the hierarchy;
112 accepting a collection of class-based queues containing a plurality of packets awaiting
113 transmission;
114 scheduling for transmission a next packet among the plurality of packets, the
115 scheduling including searching cells of the matrix for a reference to a next class in the
116 hierarchy, the next class being associated with the next packet, such that the worst-case
117 time of the searching is bounded by a finite time dependent on the fixed size of the
118 matrix.